

International Earth Science Constellations (ESC)



INTRODUCTION

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Welcome

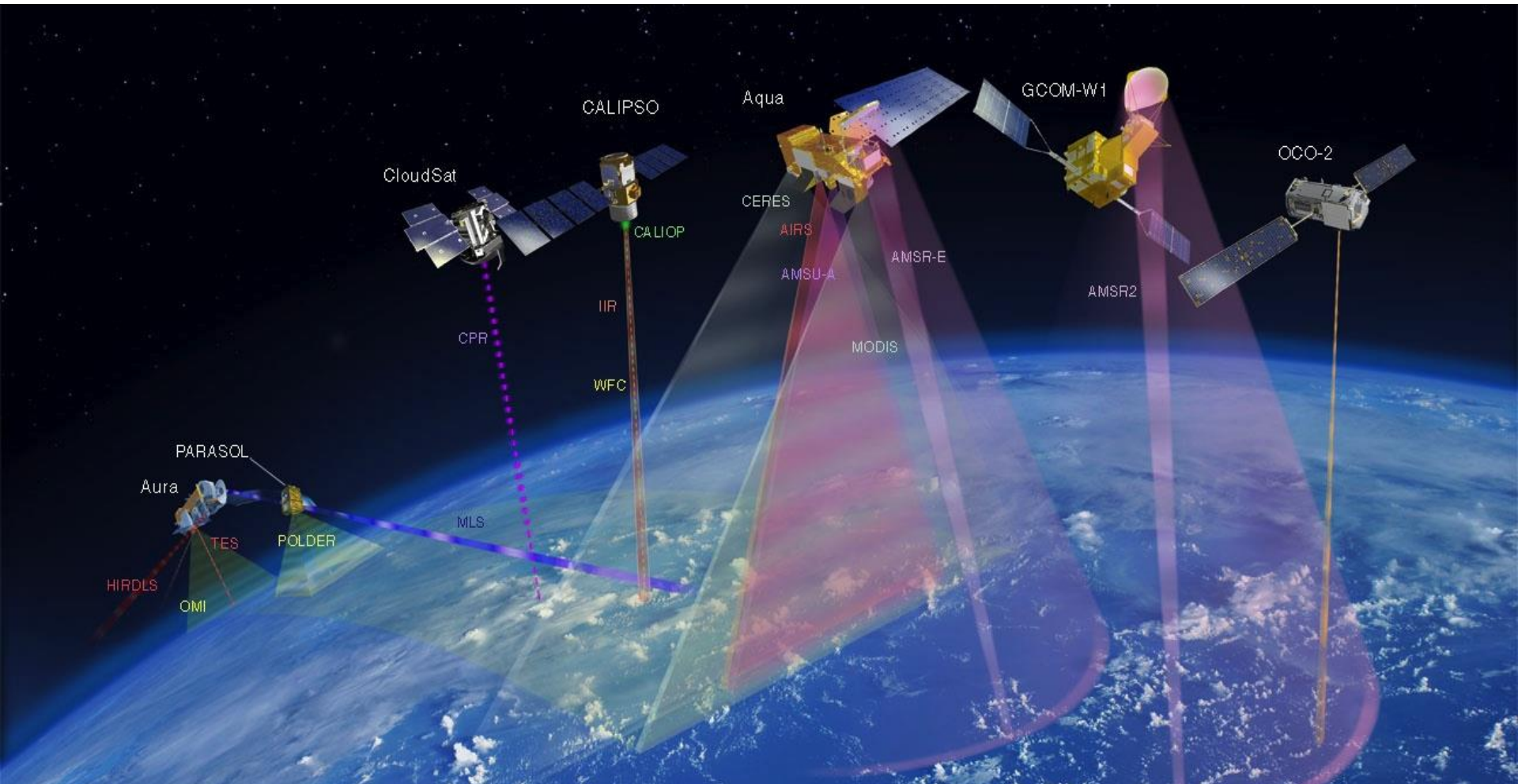
- *Welcome to all the members of the Mission Operations Working Group (MOWG) of the International Earth Observing Morning and Afternoon Constellations!*
- *Welcome especially to the team members from NOAA and ESA.*
- *Welcome to our telecon participants.*

MOWG Charter

*The Constellation mission teams
enable nearly simultaneous
science observations by
coordinating their operations and
cooperating with each other to
ensure the safety of the constellations.*

A-Train Science Graphic

(from Steve Platnick, A-Train Project Scientist)



The Earth Science Mission Operations (ESMO) Project at the NASA Goddard Space Flight Center (GSFC) leads the Morning and Afternoon Constellation mission operations working group (MOWG) to address constellation safety. The MOWG goal is to ensure the safety of the constellation satellites to enable/maximize coincidental observations.

Constellation History*

- **Morning Constellation** officially began in 1999 with the Landsat-7 launch in April and Terra launch in December. EO-1 and SAC-C successfully joined in November 2000. Landsat-8 launched in February 2013.
- **Afternoon Constellation** (A-Train) began with the Aqua launch in May 2002, followed by Aura in July 2004, PARASOL in December 2004, and the joint CALIPSO/CloudSat launch in April 2006 (“formation flying”)
- **A-Train Mission Operations Working Group (MOWG)** officially met for the first time in March 2003, preceded by an exploratory discussion between LaRC (John Stadler) and GSFC (Angie Kelly and Lauri Newman)
- **Later A-Train missions followed:**
 - **OCO (2010) and Glory (2011)** launches failed due to launch vehicle fairing problems
 - **GCOM-W1** successfully launched in May 2012
 - **OCO-2** successfully launched in July 2014
- **Next missions: ?**

Significant Meeting Topics

- **NASA HQ Perspective**
- **Current state of the missions**
- **Landsat-7 Exit Plans and Terra Exit Plan updates**
- **Long term plans for all missions**
- **CARA updates**
- **Spring 2016 IAM Series Plans and Current Status**
- **CCS Future Release Plans**
- **Results of Covariance Calculation Splinter Meeting**

State of the Constellations

• Morning Constellation

- Terra and its 5 instruments are performing nominally, except ASTER SWIR.
 - Terra safehold in February.
- Landsat 7 and Landsat 8 are performing nominally
- EO-1 is currently ~23 km below Landsat 7/8 & Terra; continuing science observations

• Afternoon Constellation

- A-Train IAM Series (Spring 2016) is ongoing
- Aqua, Aura, and GCOM-W1 are performing nominally
 - Aqua/AMSR-E ended its Science Mission on December 8, 2015
- CloudSat is operating in Daylight-only Operation (Do-Op) mode; formation flying with CALIPSO
- CALIPSO is performing nominally; making plans to switch lasers

***Constellations are operating successfully
and producing valuable science data
Excellent cooperation! Still growing and learning!***

Since the last meeting . . .

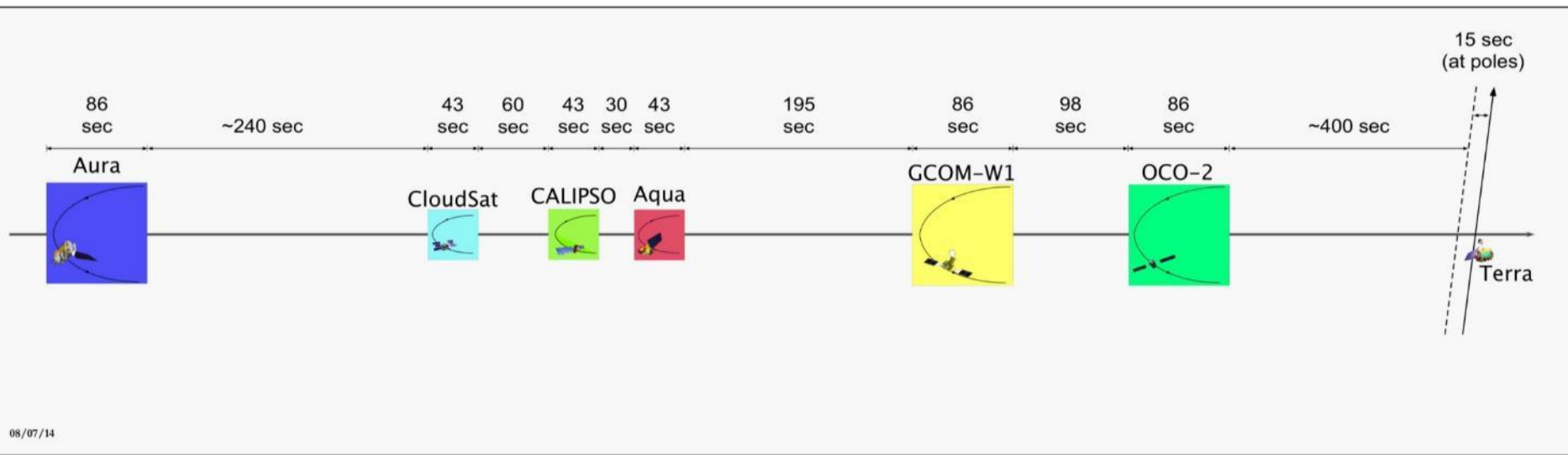


**Constellation Mission Operations Working Group (MOWG) Meeting
NASA Goddard Space Flight Center (Greenbelt, Maryland)
June 2-4, 2015**

Since the last meeting . . .

- **CCS Release 7.1 deployed in December**
- **A-Train annual inclination adjust maneuvers (IAMs) now in process during March – May**
- **Terra Exit Plan Review held in March**
- **Landsat-7 Exit Plan preparations to be presented at this MOWG meeting**
- **Lots of activity to potentially add TanSat (no longer planned)**

Afternoon Constellation Current Orbital Configuration

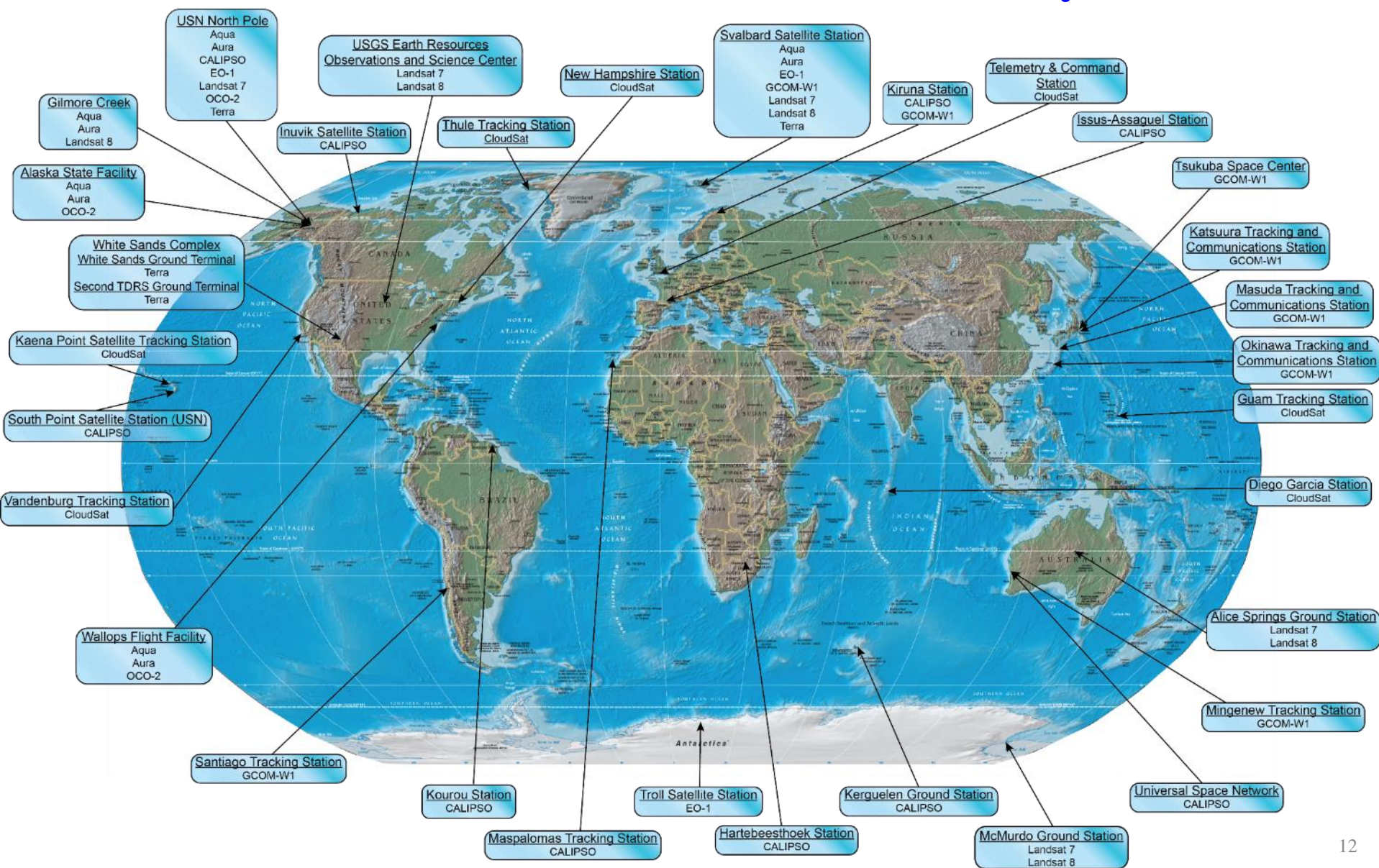


A-Train IAM Series (Spring 2016)

- A-Train IAMs are being conducted per agreements in the *Afternoon Constellation Coordinated Plan for the 2016 Inclination Adjust Maneuvers* document**

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
March 2016			1	2 ▶ GCOM-W1 #1	3	4	5
	6	7	8	9 ▶ Aqua #1	10 ▶ CALIPSO #1 ▶ Aura #1 ▶ OCO-2 #1	11	12
	13 Daylight saving time starts (U.S.)	14	15 ▶ CloudSat #1	16 ▶ Aqua #2	17 ▶ Aura #2 ▶ OCO-2 #2	18	19
	20	21 Spring Equinox (Japan)	22	23	24	25 Good Friday (France)	26
	27 Daylight saving time starts (France) Easter (US/France)	28 Easter Monday (France)	29	30	31	April 1	2
April 2016	3	4	5	6 ▶ Aqua #3	7 ▶ Aura #3 ▶ OCO-2 #3	8	9
	10	11	12	13 MOWG MEETING	14 MOWG MEETING	15 MOWG MEETING	16
	17	18	19	20 ▶ Aqua #4	21 ▶ CALIPSO #2 ▶ Aura #4	22	23
	24	25	26 ▶ CloudSat #2 ▶ OCO-2 #4	27	28	29 Shōwa Day (Japan)	30
May 2016	May 1 Labour Day (France)	2	3 Constitution Memorial Day (Japan)	4 Greenery Day (Japan) ▶ Aqua (backup)	5 Ascension Day (France) Children's Day (Japan) ▶ Aura (backup)	6	7
	8 Victory Day (France)	9	10	11 ▶ GCOM-W1 #2	12	13	14

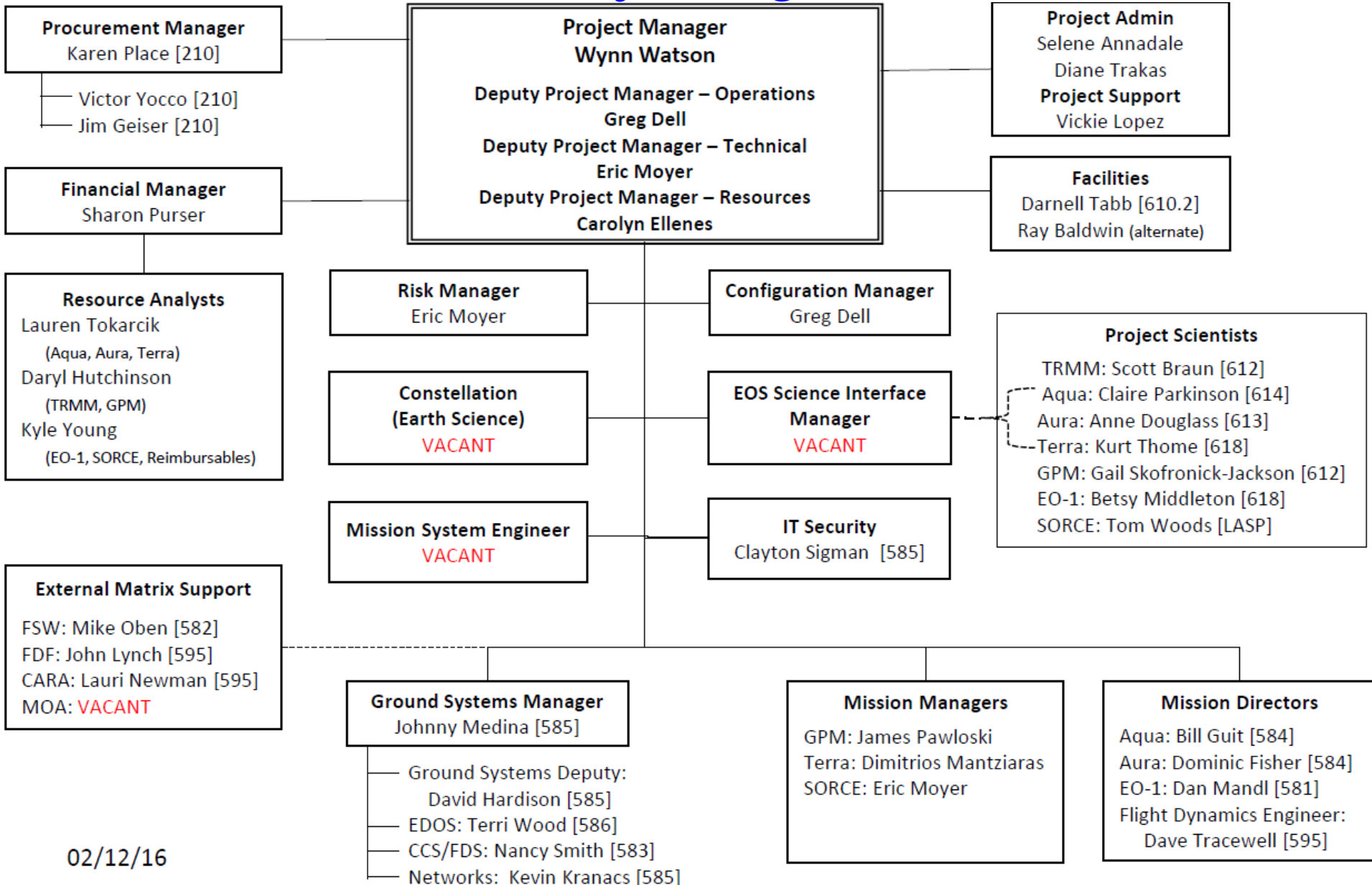
Constellation Ground Station Summary



Mission Operations Working Group

April 13-15, 2016

ESMO Project Organization



Upcoming Events . . .

- **Fall 2016 MOWG Meeting** **Sep. 27-29 or Oct. 11-13**
(Albuquerque, NM)
- **A-Train 3rd International Science mtg*** **Early 2017**
(Location to be announced)
- **Spring 2017 MOWG Meeting** **To be announced**

MOWG Action Items

#	Assignee	Description	Status / Due
1506-01	NASA team leads	Provide W. Case with concerns on the NASA 30 year re-entry requirement. Suggest recommendations. This information will be compiled and distributed back to the mission team leads and subsequently forwarded to S. Aleman/NASA HQ. CLOSED: Responses received by June 23. Summary response reviewed and then sent to S. Aleman on July 8, 2015.	CLOSED / July 8, 2015
1506 - 02	Aerospace Corp	Provide the Mean, Medium, and Standard Deviation for the equatorial and polar cases to Mark Vincent. CLOSED: Requested info provided.	CLOSED / June 4 2015
1506 - 03	Team Leads	Identify if there are any scheduling conflicts for the proposed MOWG meeting weeks of April 17, 2016 (prime) or April 10, 2016 (not prime). CLOSED: Week of April 10 selected.	CLOSED/ June 24, 2015
1506 - 04	CCS	Provide a separate stand alone delivery schedule of CCS 7.1 with good dates to all the teams. CLOSED: J. Levi provided the requested schedule to all teams on June 24, 2015	CLOSED/ June 24, 2015
1506 - 05	ESMO	Investigate distributing the Hallway display system to the MOWG mission teams. IN PROCESS: ai Solutions drafted Form 1679 to make technology available.	OPEN / July 10, 2015
1506 - 06	All	Review the CCS spreadsheet distributed earlier and provide suggested enhancements for the CCS 7.2 delivery. CLOSED: Feedback received.	CLOSED / June 26, 2015
1506-07	Team Leads	Recommend changes to the CARA template that will make it more concise and clear. These recommendations can be used by CARA when they implement approved methods for sharing collision avoidance and risk mitigation data with other nations.	OPEN / TBA
1506 - 08	M. Hejduk	Provide the JSpOC Mission System (JMS) development schedule and description of capabilities to be released later in 2015 and describe the recent covariance changes. CLOSED. Complete response presented at CARA Open House on September 29-30.	CLOSED/ August 11, 2015
OLDER ACTIONS (THAT ARE STILL OPEN)			
1309-11	CARA	Analyze our timeline for working future close approaches with another nation and factor that into our risk management process. <i>Note: This Action Item is being redefined based on the discussions at the June 2015 MOWG meeting.</i>	OPEN
1410-01	CARA	Analyze close approaches which have required mission team action on short notice. Determine why the approaches were identified later in the process than most other events. Note that this action may be handled during a CARA User Forum.	OPEN

Meeting Logistics (1 of 2)

- **Presentations**

- Please e-mail your presentation updates to warren.f.case@nasa.gov and nancy.c.herndon@nasa.gov
- All the presentations will be made available after the meeting via Goddard WebDrive server. Download instructions will be sent.
- Let us know if your presentations are “*not for public view*”.

- **Telecon Number: 1-844-467-6272, code 830887#**

- **Traditional group photo** – Day 1 during afternoon break

- **Wi-Fi**

- Information To Be Supplied

Meeting Logistics (2 of 2)

- **Group Dinner – Thursday, April 14**
 - **Map & directions are available**
- **Tour – Friday, Friday, April 15**
 - **Map & directions are available**

Arigatou Gozaimasu

Merci

Thank you

Questions?